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Specialized Solutions for Asbestos Personal Protective Equipment

Joe Oberuc

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Southern Illinois University at Carbondale

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Informative Abstract

In 1993 OSHA "estimated 1.3 million employees in construction and general industry face significant asbestos exposure on the job." The estimate has not changed according to OSHA since 1989 (Department of Labor, 1989; 1993). These 1.3 million employees all deal with asbestos in unique work settings consequently vague laws concerning Personal Protective Equipment and asbestos exist. Why are these laws vague? Recall the general duty clause, 'keep your employees safe'. Occasional asbestos work settings must be addressed by Specialized Personal Protective Equipment. The employer must adapt, change, and keep in compliance of the law while protecting their employees.

Introduction

The paper is not to be considered a complete guide to asbestos, asbestos personal protective equipment, nor is it to be considered a substitute for the Code of Federal Regulations. Dealing with asbestos at the workplace can be a serious liability and involves answering many difficult questions: i.e. Why is asbestos dangerous? What are the physiological drawbacks to using Personal Protective Equipment? What OSHA laws apply? Why is Asbestos PPE law vague? By considering and answering these questions the reader will be able to draw their own conclusion to such questions as, "Is it better to contract out for asbestos removal or train your own employees?", or "How much is involved with getting asbestos PPE in compliance?"

Why is Asbestos Used?

According to OSHA asbestos is

> . . . a widely used, mineral-based material that is resistant to heat and corrosive chemicals. Depending on the chemical composition, fibers can range in texture from coarse to silky. The properties that make asbestos fibers so valuable to industry are its high tensile strength [maximum stress that a material will withstand before breaking or tearing], flexibility, heat and chemical resistance, and good frictional properties (Department of Labor, 1989).

These properties have led to the use of asbestos in the following products: insulation (pipes, and furnace doors), building materials (ceilings, walls, roofing, shingles, and siding), liquids (patching compounds, and textured paints), appliances (toasters, broilers, refrigerators, ranges, ovens, clothes dryers, and electric blankets)(U.S. Consumer Product Safety Commission, U.S. Environmental Protection Agency, 1989), and transportation products (brake linings, and antiknock additives for gasoline)(Hammer, 1985).

Why is Asbestos Dangerous?

Asbestos readily separates into flexible fibers that are long and snake-like. The instillation or removal of materials containing asbestos could break up these fibers and release them as airborne particles. One case in point is the use of asbestos in shingles. When roof shingles are removed from their nailed or glued position they will tear or break, thus causing a severe release of asbestos into the worker's environment. Airborne particles can then blow around, settle, or be inhaled. Inhaled asbestos can cause:

1. asbestosis ("an emphysema like condition" (Department of Labor, 1989)(marked by dilation of lung air spaces, uneven tension on lung walls, and occasional heart impairment, permanent and often progressive scarring of lung tissue), The disorders can "lead to disability and death" (Department of Labor, 1993),
2. silicosis (marked by shortness of breath),

3. bysynosis (marked by shortness of breath, chest tightness, cough, and eventually irreversible lung disease)(Hammer 1985),
4. mesothelioma ("cancerous tumor that spreads rapidly in the cells of membranes covering the lungs and body organs"),
5. gastrointestinal (stomach, intestine, colon, and rectum) cancer (Department of Labor 1989),
6. other effects are clubbing of the fingertips (Hammer, 1985).

When is Personal Protective Equipment (PPE)Needed?

Exposure of contaminants is measured in fibers per cubic centimeter or f/cc. OSHA has set Permissible Exposure Limits (PELs) to asbestos. For this there are two theories that must be explained: EL and Action Level. EL stands for Excursion Level, this average is taken over a sampling period of thirty minutes. Action Level is an average over a sampling period of eight hours. If the EL (30 min. exposure) reaches or exceeds 1.0 f/cc, or the Action Level (8 hour exposure) reaches or exceeds 0.1 f/cc, then the employer must begin monitoring employee health, air quality, and start training employees. There is not to be an asbestos concentration of 0.2 f/cc over 8 hours, if so then the employer must ensure that no employee exposure exists (Department of Labor, 1989).

The theoretically easiest solution for employers who have employees working around asbestos is to remove the employee from the contaminated area. Similar to most other types of airborne contaminants OSHA recommends

removing employees from a hazardous situation by means of engineering or work practice controls. When this is not sufficient or feasible personal protective equipment must be used (Department of Labor, 1989).

What OSHA Reference Applies?

The statutes for OSHA asbestos compliance may be confusing. Please be sure to refer to OSHA §1910.1001 Asbestos, tremolite, anthophyllite, and actinolite. This law applies to employees who could be exposed to asbestos on a secondary basis, i.e. they use products that may contain asbestos, or work near products that contain asbestos. If there is any type of construction, renovation, demolition, removal, encapsulation, repair, or maintenance of asbestos "structures, substrates, or portions thereof" then follow OSHA §1926.58 Asbestos, tremolite, anthophyllite, and actinolite (Department of Labor, 1991; Quinn; Acer, 1990).

What are the Physiological Drawbacks to Using PPE?

A thorough test was undertaken to decide if there are any severe stresses associated with the use of protective respirators while wearing lightweight disposable coveralls. The coveralls used were Tyvek® 1412 polyolefin. The tests involved four different groups, all groups wearing coveralls:

1. Control (a lightweight, low resistance mask),
2. HEPA (an air purifying, full facepiece respirator with dual high efficiency filters),

3. SAR (a supplied air, pressure-demand respirator with escape filter),
4. SCBA (an open circuit, pressure demand, self-contained, breathing apparatus).

Findings - conclusions,

> Physiological measurements obtained every minute during each [treadmill work] test included heart rate and skin and rectal temperatures. Subjective evaluations of clothing, respirator, and facepiece comfort, ease of breathing, [were recorded as well as] temperature and perspiration in the mask and clothing, and respirator load also were measured at the end of each test. Data were analyzed using an analysis of variance.

Skin and rectal temperatures changed by only 0.2 °C during the test. Heart rate difference was increased by only 8 beats/minute between the lightest (Control group) and heaviest (SCBA group) respirators. The authors concluded the data showed, "that heavier, more protective respirators may be associated with only minimal additional physiological and subjective stress in selected low work load asbestos abatement industry work settings" (White, Hodous, Hudnall, 1989).

How Do I Interpret the Law?

OSHA §1910.1001(h) states,

> the employer shall provide at no cost [to] the employee and ensure that employee uses [sic] appropriate work clothing and equipment such as, but not limited to:
>
> (i) Coveralls or similar full-body work clothing;
>
> (ii) Gloves, head coverings, and foot coverings; and
>
> (iii) Face shields, vented goggles, or other appropriate protective equipment that complies with §1910.113 of this Part [29].

In 1991 Occupational Hazards printed a story by Laurie A. Rich titled "Clothing of Peril." Rich examined the §1910.1001 law and asked, what type of clothing is appropriate? Face shields and vented goggles are regulated by §1910.113; however, there is no obvious statute referenced for appropriate coveralls, full-body work clothing, gloves, head coverings, and foot coverings. Refer to the OSHA General Duty Clause statement that the "[employers must] assure safe and healthful working conditions for working men and women . . . "(91st Congress, 1991). You are obligated to ensure that your employees are provided with the proper safety equipment for their particular job.

Are impervious coveralls (suits) a requirement under OSHA Subpart I - Personal Protective Equipment? The answer in 1991 according to Rich was "no". In 1991 and 1994 the answer is "maybe". Read the general duty clause again.

You may conclude that impervious coveralls are not a requirement in all work environments. Keep in mind that even if impervious coveralls are used, an effective shower must still be administered [see OSHA §1910.141(d)(3) Sanitation, showers].

Summary

The laws concerning PPE and asbestos were written a little vague on purpose because every working condition demands special attention. PPE for asbestos is often called SPPE, or Specialized Personal Protective Equipment. The application of PPE for asbestos is specialized.

SPPE includes work conditions that involve heat stress, hazardous work conditions (resisting tears, burns, and projectiles), and the potential exposure to other chemicals. These high risks may cause an employee to wear more than one layer of protective clothing. The layering and specifics of each layer will be determined by the work condition.

It is not always necessary to reinvent the wheel. Unique working conditions demand their own PPE strategy. Safety directors, technicians, or employees outside your organization may be able to provide a model suited to your work environment. One great resource for finding PPE models for your industry are professional journals.

Processional journals include:
[your own occupational journal]
American Industrial Hygiene Association Journal
American Journal of Industrial Medicine
American Review of Respiratory Disease
Annals of Occupational Hygiene
Applied Occupational and Environmental Hygiene
Archives of Internal Medicine
Asbestos Abatement
Asbestos Issues
British Journal of Industrial Medicine
Chemical Engineering
Engineer, The
Environmental Research
Environmental Waste Management
Industrial Safety and Hygiene News
Journal of Environmental Health
Journal of Safety Research
Journal of the American Medical Association
New England Journal of Medicine
Occupational Hazards
Occupational Health & Safety
Safety & Health
Scandinavian Journal of Work

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